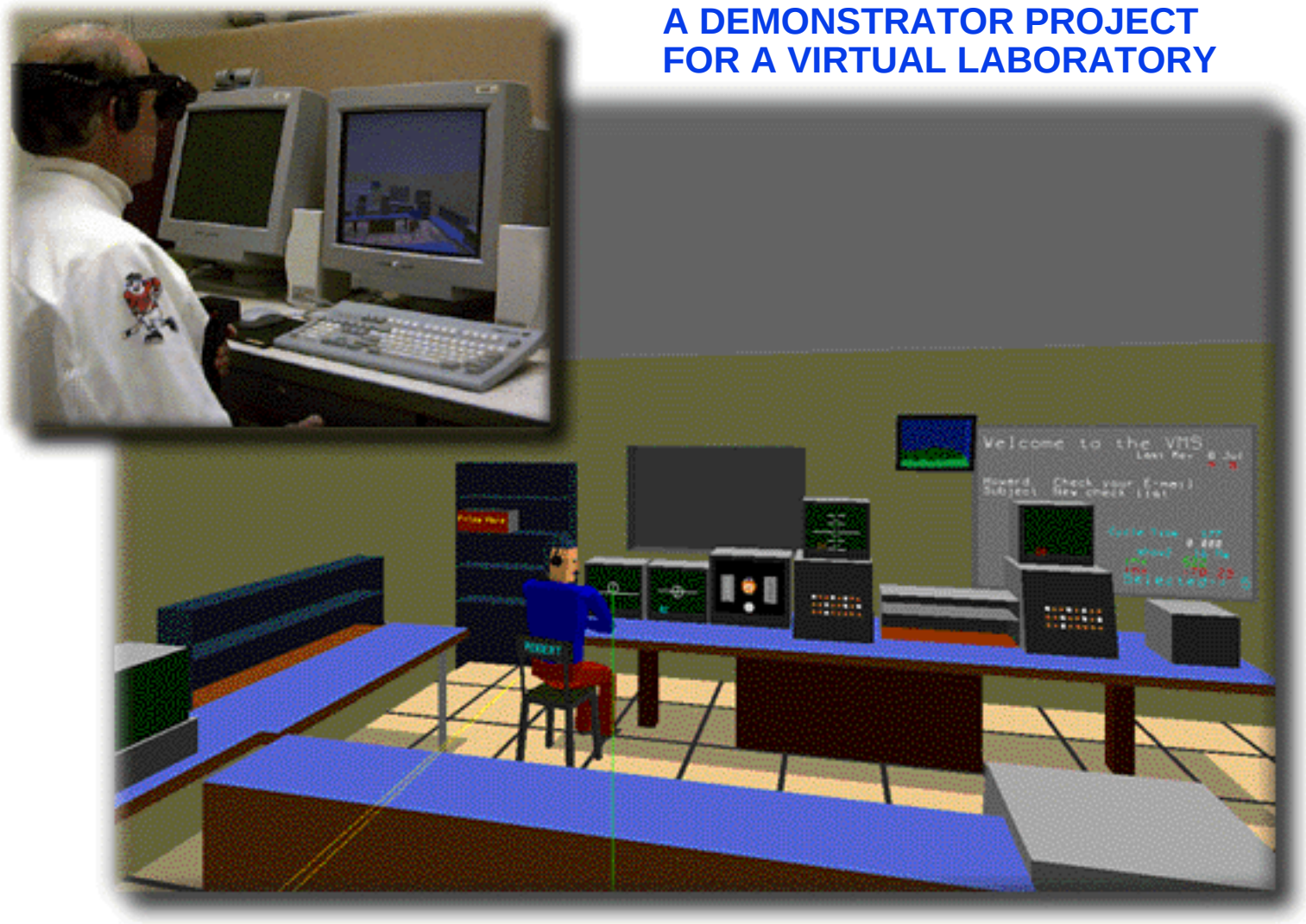
Ames Research Center
Aeronautical Test and Simulation Division

VIRTUAL SIMULATION LABORATORY

A DEMONSTRATOR PROJECT FOR A VIRTUAL LABORATORY



Simulation Laboratories

THE VIRTUAL LABORATORY

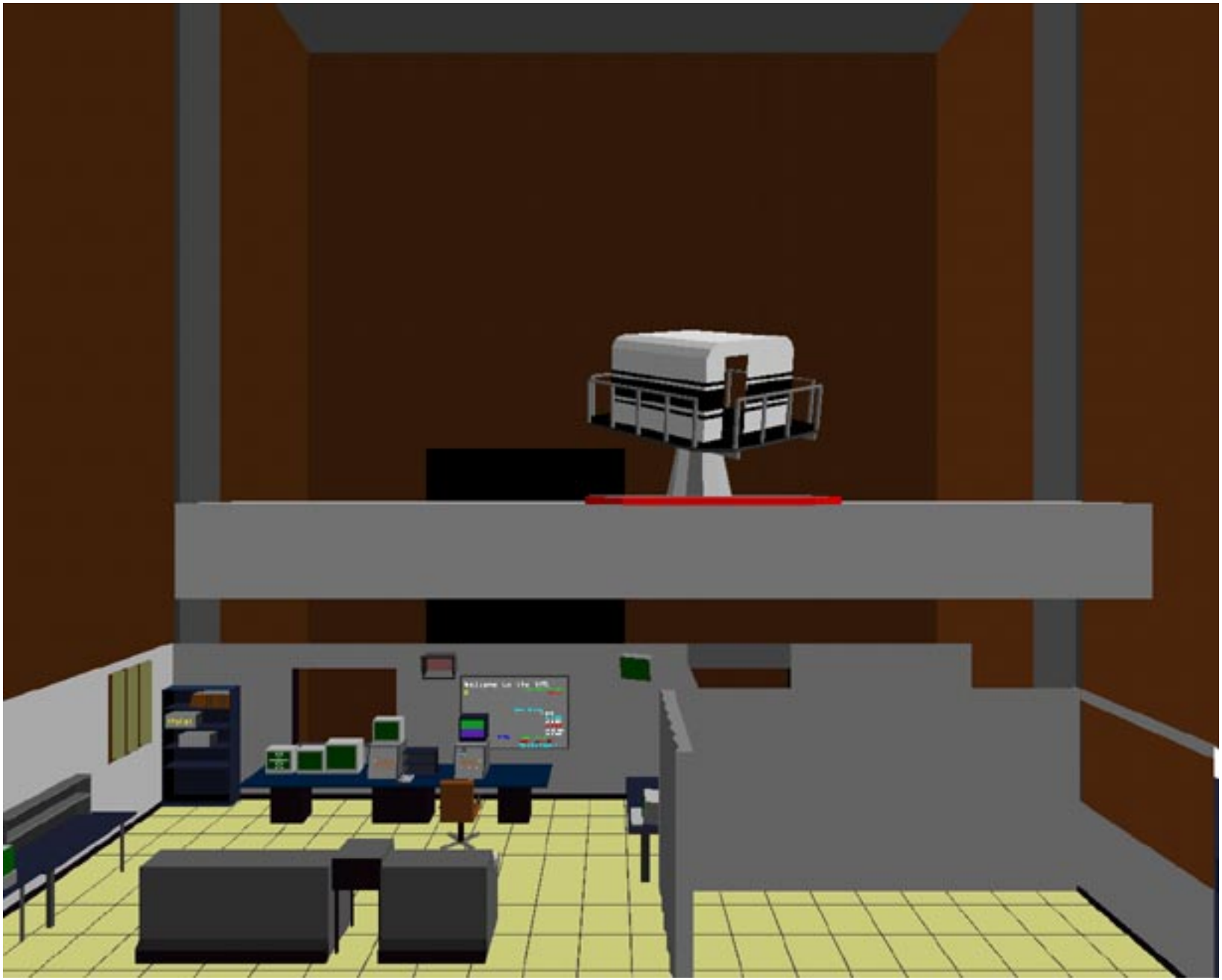
> *A VIRTUAL ENVIRONMENT PROVIDING REMOTE ACCESS TO ARC SIMULATION LABORATORIES*

- Monitor and actively participate in a simulation experiment from any location in US
  - user defined displays
- Integrated desktop development system allows researcher to;
  - develop math models, displays, control systems
  - validate models for higher quality experiments
  - provide fully compatible S/W modules to SimLab
- Virtual prototyping
  - cockpit design
  - lab data system layouts
- Demos, PR, education
  - demos made available regardless of location
  - include multiple groups simultaneously
  - low cost observers stations

CENTRAL ROLE OF SIMULATION IN AIRCRAFT DESIGN CYCLE

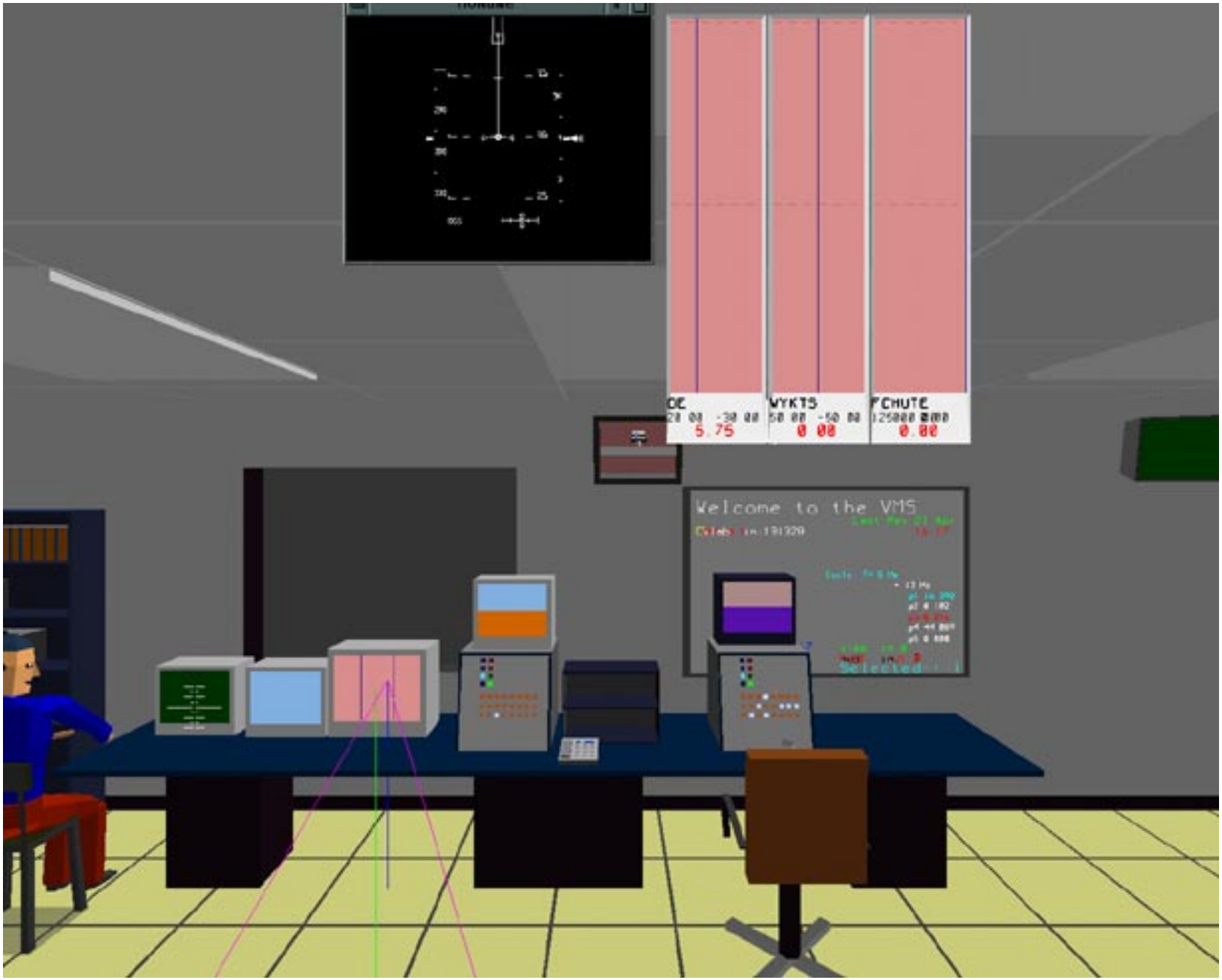
- Delivers NASA's simulation capability to industry's doorstep
  - ARC simulators are high fidelity, research oriented facilities
  - ARC simulators can be used for specific, focused purposes as well as basic research topics
- Allows industry to iterate design steps with piloted simulation
  - faster, less expensive pilot-in-the-loop evaluation of designs
  - closes loop with CFD and WT testing for better design decisions earlier in the process
  - interoperability among AOS facilities such as ATC, SDTF, full mission, and part task
  - collaborative work with Neural Net simulations (Code I)
- Enables industry/government partnerships to the benefit of US aeronautics
  - easier access to National facilities
  - shared databases
  - more effective and efficient design process

Graphic of Virtual VMS Control Room

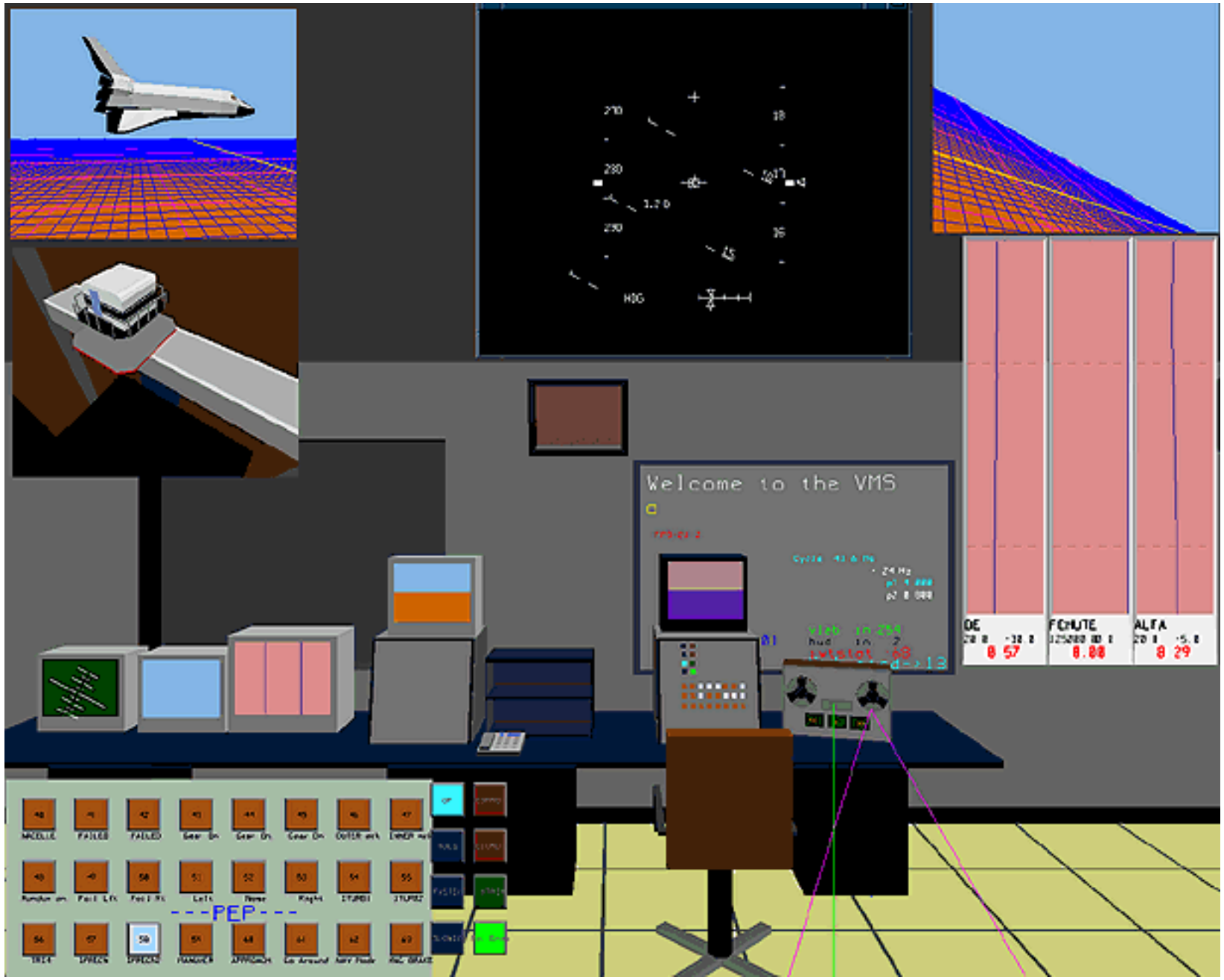


Graphic of Control Room and Motion System

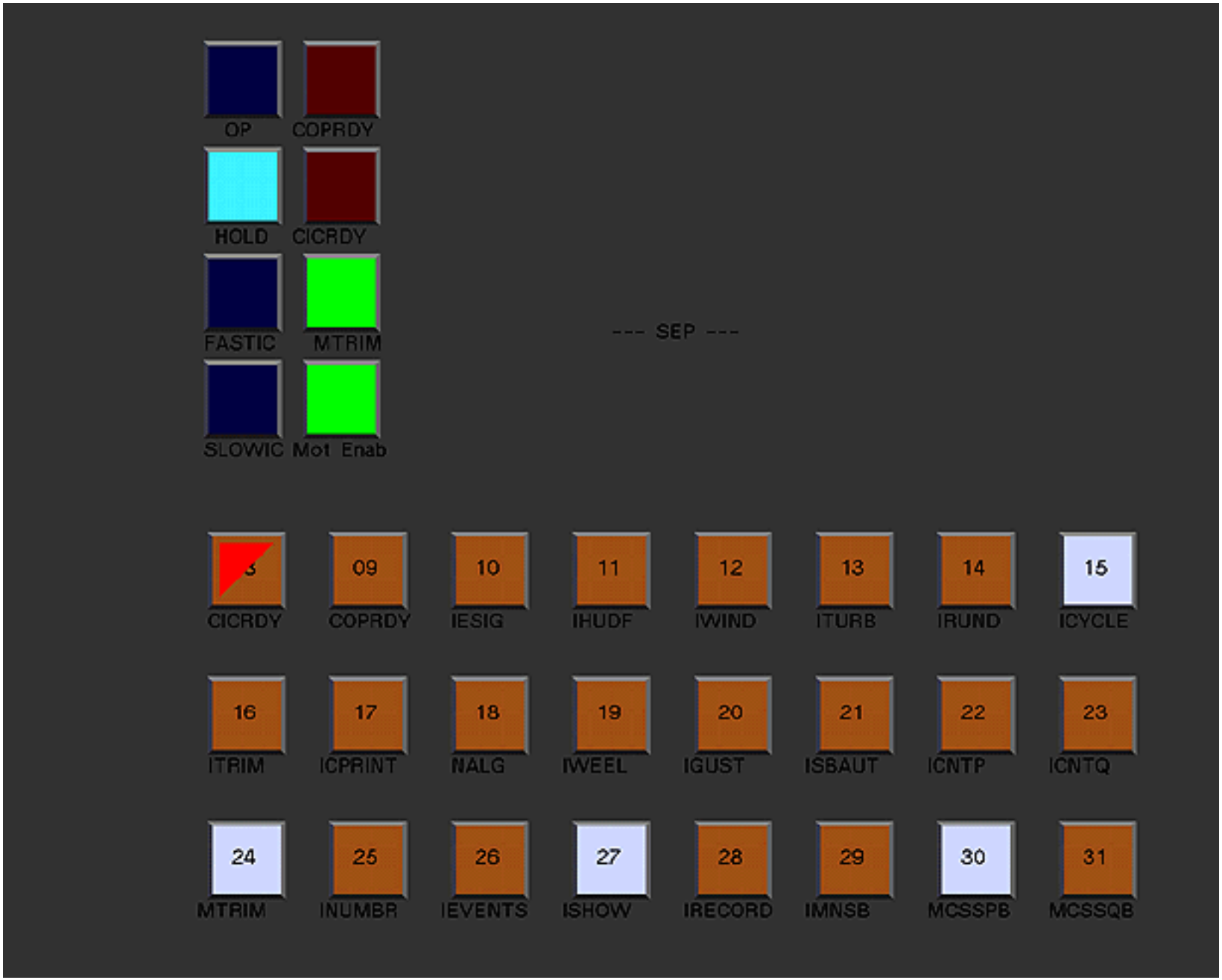
3-D Virtual Environment with 2-D HUD Overlay



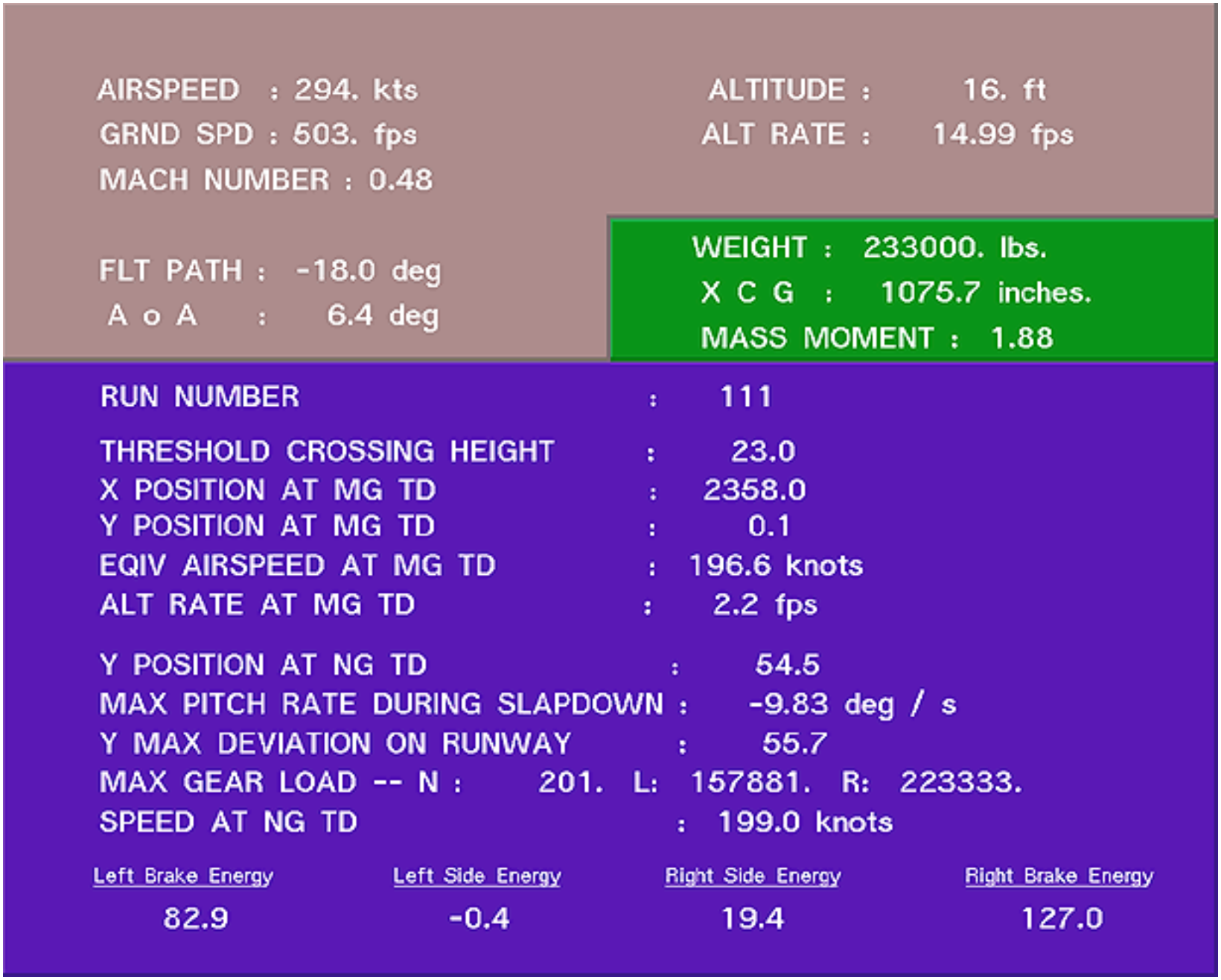
Strip Charts Added to Display



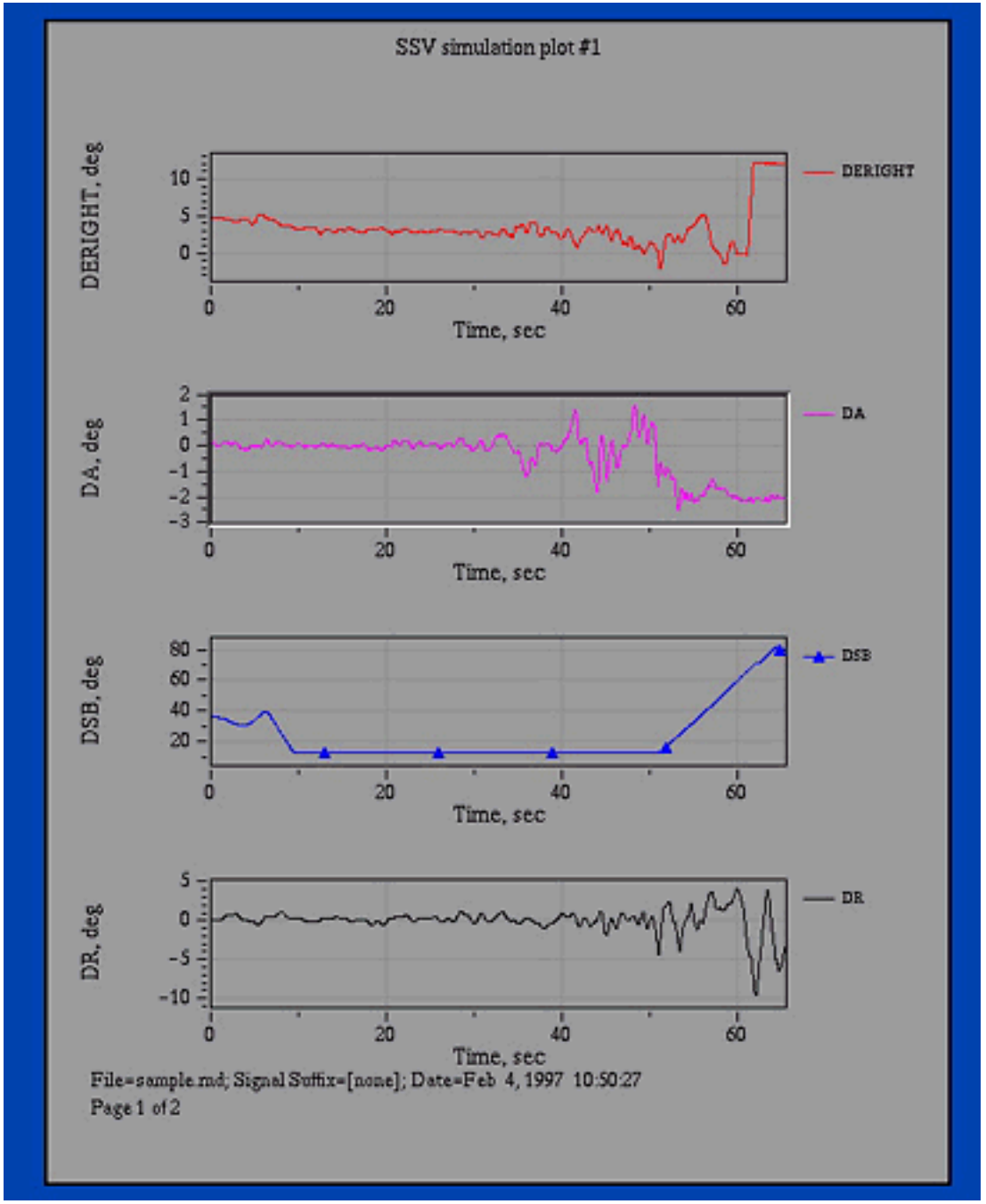
Several 2-D Overlays Added to Virtual Lab



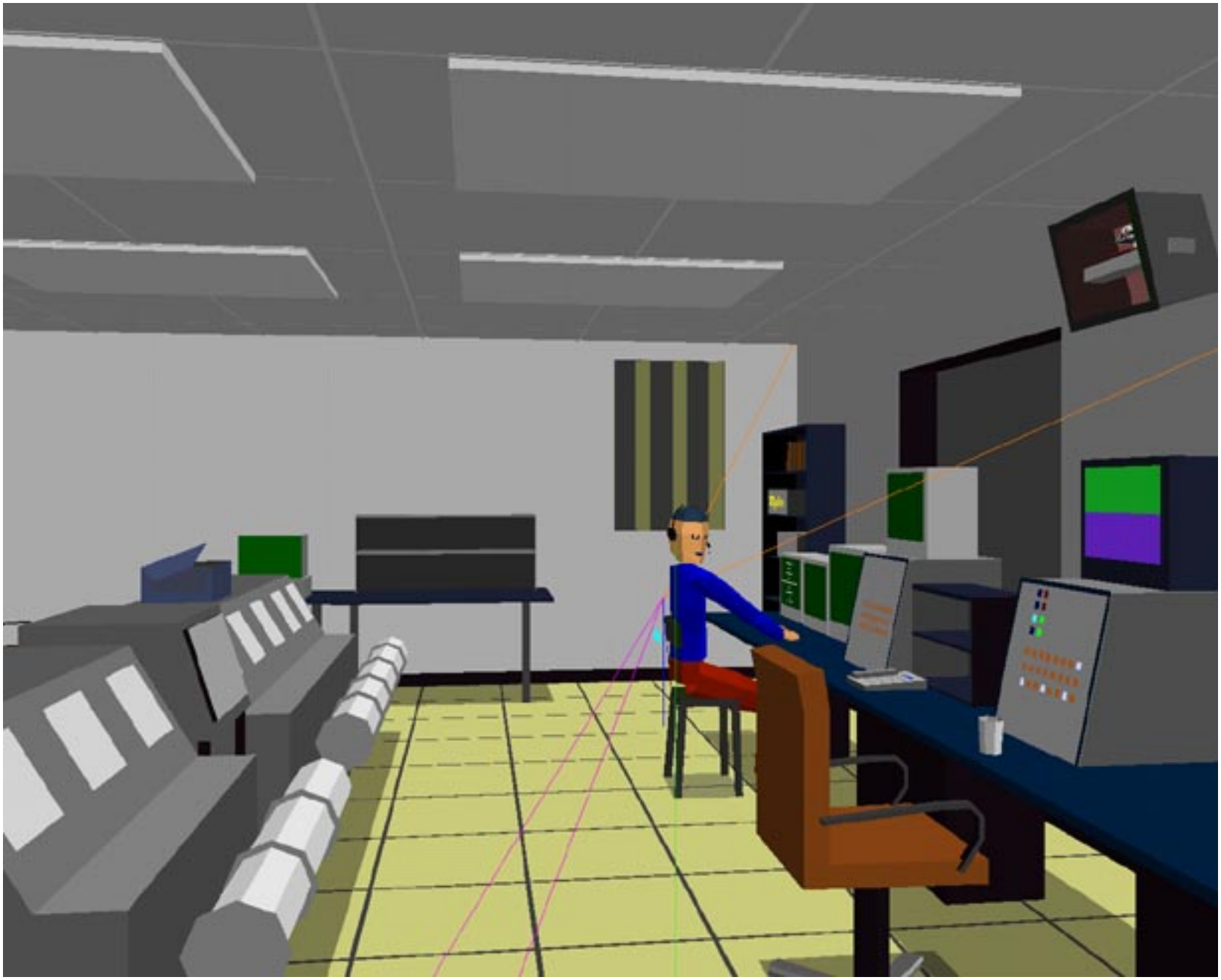
Zoom of Push Button Panel



End of Run Display



X-Y Plotting Using Quickplot



Another Perspective on Virtual Lab

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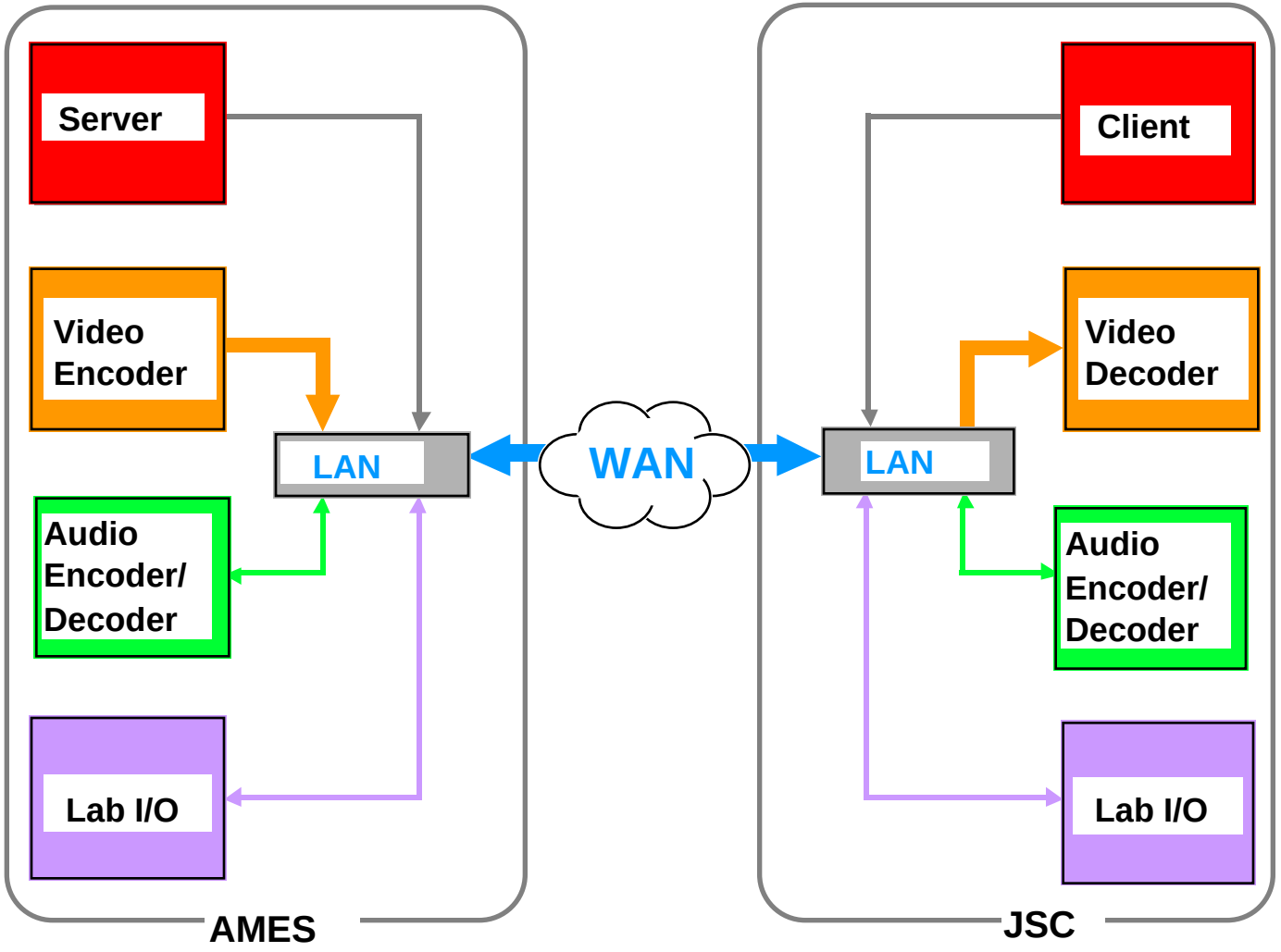
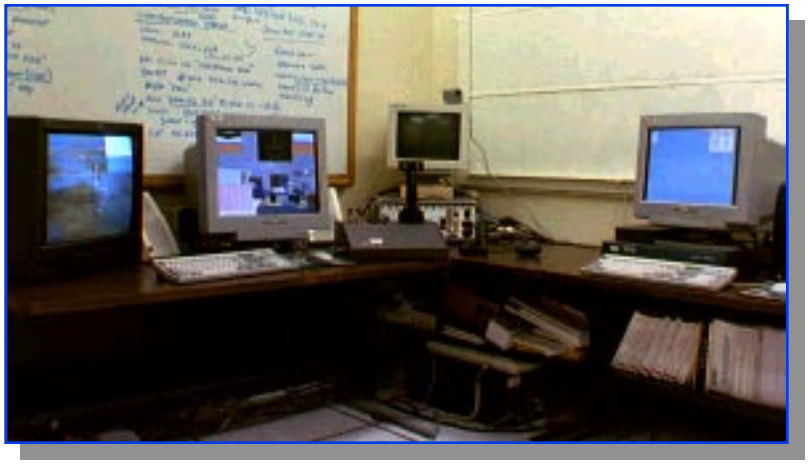
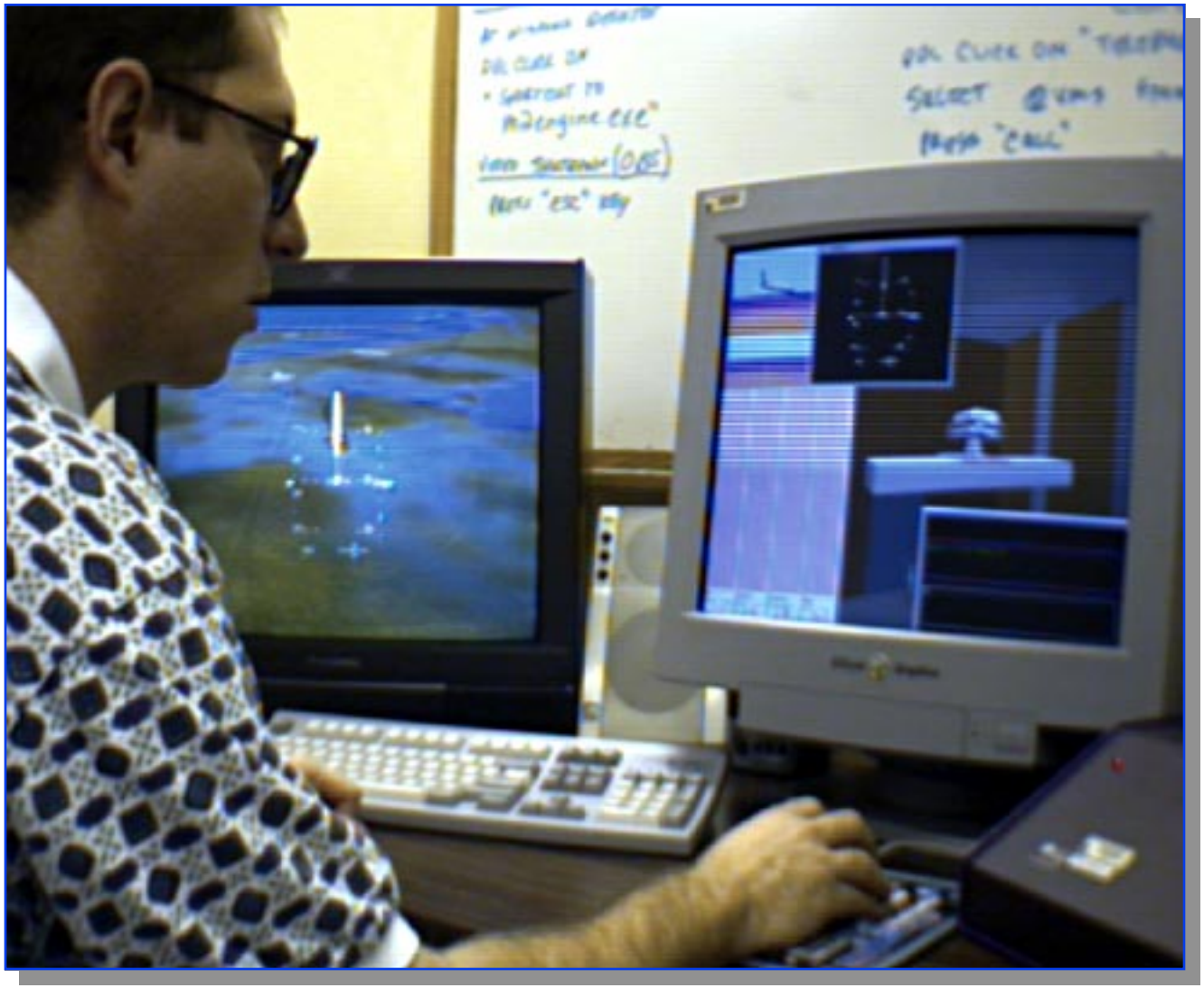
VLAB Systems Block Diagram



Simulation Laboratories

VLAB Configuration at the Johnson Space Center (JSC)





‘Teleresearcher’ at JSC

Research Test Plans

- *Baseline Performance*
- *Regular Performance Testing*
- *Latency vs. Realtime at VMS*
- *Evaluate Alternate Communications Methods*
- *Compare Different Operational Modes/Procedures*
- *Evaluate Research Effectiveness with Different Configurations*